2017-01-05

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Hughes, W.P, Jr., "Maritime innovation: a discussion with NPS faculty and students," CHIPS, the Departmenr of the Navy's Information Technology Magazine, 4 p.
http://hdl.handle.net/10945/55128

CHIPS THE DEPARTMENT OF THE NAVY'S INFORMATION TECHNOLOGY MAGAZINE

Maritime Innovation

A Discussion with NPS Faculty and Students

By Dean Emeritus Wayne P. Hughes, Jr. - January 5, 2017

A better title than Innovation, the achievement of which too many people theorize about without success these days, would be the ossification seen in big organizations like the Navy and what to do about it. But a talk about *ossification*, or rigidity, or calcification, or sclerosis, or intransigence would sound too petulant. So after a few words describing two aspects of the contemporary Navy's problem, I'm going to flip to the other side of the coin and talk about two beacons of innovative success to inspire actions that may free us to get going with productive, affordable innovation. One is in the Navy at large, and one is here at NPS.

Since I came to NPS in 1979 I have seen the Navy become more and more frozen into inaction. Here are two reasons that don't get the recognition they deserve:

-- Our latest IG inspection report exhibits a Navy-wide attempt to make no mistakes in the belief that the way to be perfect is to follow rules and regulations, instead of seeking new modes of effective teaching, such as distance learning. At the Naval Postgraduate School our number of lawyers, safety inspectors, examinations, briefings, and administrative staff to assure security, perfect record keeping, accounting, suicide prevention, equal opportunity for minorities, women's rights, flawless energy conservation, and safe travel exhibit Navy priorities on compliance with rules better than my mere words can do. The first evidence of Navy ossification is that we promote people to positions of authority who take no risks, comply with the rules, and never make a mistake. It is a society that rewards doing nothing perfectly.

-- The second problem is one that all big organizations suffer from, but is worst when they are big government organizations. I call it diseconomies of scale. There is such a thing as critical mass. Until an organization is large enough to produce a product effectively it cannot produce one efficiently. Henry Ford and his mass production symbolize the beginning of large-scale, efficient production. He also symbolizes the diseconomies of getting so big that General Motors almost destroyed Ford with a more modern auto while Ford procrastinated and sold Model T's for "just one more year." Ford had become efficient but ineffective because its bureaucracy had destroyed its ability to innovate. Fifty years later the whole Detroit auto industry almost died when foreign builders of cars and trucks — aided by cheap transportation — stole our market with better vehicles than Detroit's stodgy, complacent, auto designers were producing. A modern example is Google. Like the World Wide Web, Wikipedia, and other computer technologies, its critical mass is very big. Google has achieved a critical mass and is enjoying successful economies of scale. But Google, like Apple, must innovate to stay ahead of the competition. If government doesn't interfere to bail out the losers, or inhibit start-ups who have better ideas, diseconomies of scale in the commercial world will be obvious when the competition forces innovation or death. The high-tech world is littered with corpses of big organizations that could not adapt.

But big government is different. Big government is a monopoly that wants to stay that way. DoD and the Navy are a special case because we won't know when we suffer from diseconomies of scale until we fail catastrophically in war. Two years ago I wrote an essay called "A Business Strategy for Shipbuilders" that says you don't have to predict the future to know changes have already happened that should have affected our Navy. We ought to be in a "catch up" mode to recover from five major things that have already happened during the past 20 years:

-- The foremost *operational* change is that the seas are no longer a safe sanctuary for U. S. fleet operations.

-- The foremost national *security* change is the nation's growing debt that threatens to make the

Dean Emeritus Wayne P. Hughes, Jr. with NPS students. Photo courtesy of NPS.

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-- The foremost national *strategy* change resulted from the rise of Chinese maritime interests and ambitions.

-- The foremost *technology* change was "the revolution in military affairs" with its precision missiles and accurate detection, tracking, and targeting.

-- The foremost *impending* change underway is the ever larger number of small, versatile, inexpensive, unmanned and increasingly autonomous vehicles.

In the past we were timely enough in shifting from the battleship era to the carrier era of warfare at sea, but we have missed the transformation to the missile era that started with a successful missile attack on the Israeli destroyer *Eilat* in 1967. The Israeli navy quickly responded with small *Sa'ar* boats carrying Gabriel missiles and by 1973 was ready to fight and win the first sea battles with missiles. Israel did that in just six years. By contrast, until very recently the U.S. Navy hadn't deduced that missile warfare is fundamentally different from carrier warfare because lethal missiles can be distributed in smaller and more numerous warships.

Now there is a new transformation going on. Call it the era of robot and cyber warfare. It is another factor that will make smaller fighting vehicles more valuable and swarm attacks more and more common.

A new book *Ghost Fleet* by Peter Singer and August Cole describes a big war when China attacks and nearly destroys the U. S. fleet with cyber-attacks and unmanned, sometimes robotic, vehicles. Unlike the surprise air attack on Pearl Harbor in 1941, the Chinese conduct a successful surprise invasion of Oahu and seize the island. The story is all good fun, with the U. S. now in the position of the loser who, Islamist-like, begins our own terrorist attacks with Special Forces assassinating Chinese leaders on the island. But there is nothing imaginary about the Chinese cyber worms that destroyed our ships' ability fight, or the unmanned strike vehicles that participated in the destruction of our forces defending Hawaii. Read the book to see what innovation has already wrought upon modern warfare at sea.

The 2015 movie called *Eye in the Sky* introduces the overdone question of robot ethics. It exaggerates the emotional side of unmanned vehicle attacks, but it is on target in exhibiting the advantages of Predator-sized attackers over manned strike aircraft, and the presence of very small, bird- and even bug-sized searchers that are here now (or almost here).

I won't speak further about Navy innovation as a whole, because the bureaucratic goal of perfection — of never making a mistake — has crippled it. But I can point to an exception that I hope will have more and more influence on the future Navy. Swift progress in the Surface Navy is going on almost unnoticed in the press and on the blogger circuits.

A Real Innovation Underway

Our Surface Forces under the leadership of VADM Tom Rowden are setting an example for the rest of the Navy. In just over one year the Commander of our Surface Forces has accomplished three things that are changing how surface forces will fight effectively and affordably in the rest of the 21st Century. In a word, he has embarked on real innovation to achieve a big change in a short time.

First, Admiral Rowden published a framework called Distributed Lethality to unify all Surface Navy endeavors. Distributed lethality establishes an offensive mindset that will force the enemy to be ever-ready to defend against our sudden surprise attacks. This reverses the surface navy's longstanding defensive role in CVBG, ESG, and convoy protection. Rowden is specific about creating a team that employs UAVs to detect the enemy so that surface warships can deliver ASCMs to attack the enemy first. He envisions the scout-to-shoot forces embedded in a moving deadly circle that is hard to detect out to a range of 100 nm or more and is designed to attack at a time and place of our choosing.

Second, Admiral Rowden is specifying actions to give his surface forces an immediate, more distributable offensive capability to achieve his intentions insofar as possible with existing ships and aircraft, manned and unmanned. He wants to show the way to achieve distributed lethality during his all too short tour as Commander of Naval Surface Forces. I don't know everything going on, but a standout event is deploying what is called an ADP, an Adaptive Force Package, comprising an experienced task group commander, three DDGs, and enough UAVs and helicopters to test the performance of the deadly circle in one segment. This month the AFP task group departed on a long cruise to the Western Pacific with plenty of new tactics and tests to try out.

Admiral Rowden has also tapped the NWC and NPS to achieve affordable distributed lethality in the immediate future.

Third, he is specifying actions to take *now* to make the *future* Surface Force more distributable. He wants to build a large number of small missile combatants with minuscule crews but lots of firepower. He wants them affordable enough that we can deploy many squadrons of them. How many squadrons? The Chinese have 80 *Houbeis* or soon will. I want to name our new littoral combatants *MINUTEMEN* because they will strike silently and unexpectedly and be small enough that when one is detected and put out of action the crew is saved and the ship abandoned. *MINUTEMEN* squadron tactics will be the opposite of our big expensive warships that must be saved when hit and incapacitated. And there will be many other things he can do to respond to the five changes I cited above that should have already affected how our navy is constructed and will fight in the future. The little *MINUTEMEN* must be inexpensive — "design to cost" has a bad reputation in the US Navy, but I think $100 million in series production is an absolute top construction cost under a concept that we will never send one through overhaul but instead replace the design after 5 to 15 years with a better one.

Doubtless you will have questions at the end and I will do my best to answer them, but the important thing to note is how quickly innovative thinking can change our Navy, as it did in the Israeli navy.

The Naval Postgraduate School's Role in Innovation

I close by pointing out how the Naval Postgraduate School is supporting innovative products. There is plenty of rigidity in civilian academia, which is now tolerating frivolous student protests, is abusing the tenure system, and is promoting based on publication by the pound instead of on usefulness, to name three. I am proud to say NPS has escaped many of these unimaginative academic standards even while overcoming the restrictions of Navy lawyers and the Inspector General. In anticipating Navy needs we have stayed a good five years ahead of the Pentagon in anticipating future opportunities and risks.

-- A standout for many years is unmanned vehicle development under Dave Netzer, Jeff Kline, and now Ray Buettner. NPS UAVs have been a near-perfect example of successful development and swift deployment to the fighting forces.

-- In 2001 our Total Ship Systems Engineering students designed a 400-ton small combatant called *Sea Lance*. Currently a new TSSE class under Fotis Papoulias and Jake Didoszak is designing a follow-on *Sea Lance II*, aptly named the *MINUTEMAN* class, to fill Admiral Rowden's needs. If the Navy had bought Sea Lance and gained tactical experience, we would be much further along, and blending tactics, technology, and ship design for today, and very low cost in construction and manning.

-- The IT curriculum students under Dan Boger are ready now to give Surface Forces an immediate system of C2 that is reliable, adaptable, and hard to detect. For the past two years, Network Optional Warfare (NOW) operational concepts have enabled students to explore alternative courses of action in support of Distributed Lethality.

-- The Warfare Innovation Continuum draws contributions from almost everywhere across campus to make the Navy aware of the technological and tactical future. It was testing distributed combat systems of many kinds five years before Admiral Rowden had a chance to do something about it. Come to think of it, the Naval War College faculty needs to follow the WIC, led by Jeff Kline, and join in its far-sighted research on campus.

-- Interdisciplinary studies and research are far more common at NPS than in other universities and undergird our uniqueness.

-- An underappreciated asset is our foreign student advantage. Again and again I have seen them bring perspectives that our faculty and students would not otherwise appreciate.

-- The Littoral Operations Center (LOC) has become well known internationally and is highly respected for promoting cooperation in tactics, technology, and operations to fight in the dangerous littorals.

-- The LOC has been valuable in combining different interdisciplinary skills. For example, experimentation with mesh networks for almost silent operations is going on here. In collaboration with Dan Boger's IT students, the product can make Admiral Rowden's moving deadly circle more silent and deadly and do it now.

In conclusion I leave with you with these thoughts. The recent IG inspection of NPS was about as good as it gets. Nevertheless if you read the residual criticisms, the inspectors left us with a list of further actions that are all administrative, and all are about following the plethora of rules and laws imposed in the desire for perfection over progress. The subsequent 2016 re-inspection report found excellent NPS compliance on a plethora of administrative issues, but did not say much at all about our fundamental mission serving Navy and Marine Corps needs.

I am reminded of a famous saying I first heard expressed by one of our finest Under Secretaries, Jim Woolsey, in 1975: The three most untrustworthy statements one can hear are, "The check is in the mail;" "Yes I'll still love you in the morning;" and *"I'm from Washington and I'm here to help you."*

Our challenges are clear. The world is changing rapidly, and the nation needs the Navy to stay abreast. Maritime innovation for the surface fleet is happening, and collaborative contributions by NPS students and faculty are perhaps more important than ever. Trust your experience, instincts and knowledge to keep following that path of innovation together.

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Online ISSN 2154-1779; Print ISSN 1047-9988